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UD Engineer Wins Top Research Award

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UD ENGINEER WINS TOP RESEARCH AWARD

DAYTON, Ohio -- Particles of dust, pieces of meteoroids or debris from spacecraft--all more commonly known as "space junk"--can travel in space at speeds of 5-30 kilometers per second, causing catastrophic damage to objects in their path.

A.M. Rajendran, a research engineer in the University of Dayton Research Institute's (UDRI) structural integrity division, has earned UD's Wohlleben/Hochwalt award for his computer analysis of materials and structures he hopes will escape the damage of space junk.

Rajendran will receive UDRI's top research award, which includes a $1,500 stipend, at the annual President's Recognition Dinner on May 8.

As part of his analysis, Rajendran creates a mathematical model for a certain type of material, then installs a code on his computer to simulate the damage that material might receive from a piece of flying debris. His work with colleagues David Grove and Mark Dietenberger serves as a precursor to laboratory experiments, which are more expensive and time-consuming than computer analysis.

"Experiments tell you, 'It failed. It cracked.' That's it," says Rajendran. "What I do is I understand what is happening microscopically."

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As part of a four-year $1.2 million research venture with the Air Force, Rajendran has developed a mathematical model revealing conditions under which metallic materials are damaged. Under the same contract, as well as a three-year $600,000 deal with the Allied Signal Corp., he is developing a mathematical model that will predict damage caused by dust and other particles to ceramic aircraft engines.

Rajendran believes ceramic engines will be the wave of the future because they are lightweight, perform well at high temperatures and consume less fuel. He plans to computationally perform "thousands of experiments" to understand the damage ceramic engines encounter, thus aiding him in designing another ceramic component to thwart future damage.

Soon, he'll be ready to produce an actual 3-D engine component on his computer by using the Cray computer at the Ohio Supercomputer Center in Columbus. This will allow Robert Bertke of UD's impact physics laboratory to shoot projectiles at that ceramic component through a light-gas gun.

"My opinion is, I haven't validated the model in real life applications, but I've reproduced the laboratory tests accurately," said Rajendran. "Now I want to see if we apply the model in real life situations, if it'll work as it does on a lab specimen."

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For media interviews, contact **A.M. Rajendran** at (513) 229-4479. Rajendran lives in Centerville.